

CLAIMS

WHAT IS CLAIMED IS:

- 1 *Sub a1* 1. A method for managing risk in a market related to a commodity delivered over a
 2 network, comprising the steps of:
 3 modeling locational prices of the commodity in the market as a linear combination of
 4 congestion prices for congestible lines in the network; and
 5 producing a combination of price risk instruments for the market in a proportion such
 6 that an effect of the congestion prices for the congestible lines on the locational
 7 prices of the commodity is reduced.
- 1 2. The method according to claim 1, wherein the step of producing the combination
 2 of price risk instruments includes producing the combination in a proportion such that the
 3 effect of the congestion prices for the congestible lines on the locational prices of the
 4 commodity is eliminated.
- 1 3. The method according to claim 2, wherein the step of producing the combination
 2 includes selecting a portfolio y of price risk instruments, such that:
 3
$$z'A - y'P'A = 0,$$

 4 where A represents distribution factors describing the physics of power flows in
 5 the network, P represents the available market of price instruments, and z represents a
 6 market participant's underlying position in the market at a prospective time T .
- 1 4. A portfolio derived by the method according to claim 3.

1 5. A method for evaluating a portfolio of price risk instruments in a market related to
2 a commodity delivered over a network, comprising the steps of:

3 estimating a plurality of distribution factors indicating effects on one or more
4 congestible lines in the network due to transfers of the commodity at respective
5 locations in the network; and
6 evaluating the portfolio based on the estimated distribution factors.

1 6. The method of claim 5, wherein the step of evaluating the portfolio includes the
2 step of calculating a cost f based on the formula $f = (z'A - y'P'A)\lambda + y'F$, wherein:

3 y represents the portfolio of price risk instruments;
4 z represents underlying positions in the market at the prospective time;
5 P represents a market of available price risk instruments;
6 F represents prices for the available price risk instruments;
7 A represents the distribution factors; and
8 λ represents prices of congestion for the congestible lines;

1 7. A method for hedging a set of underlying positions at a prospective time in a
2 market related to a commodity delivered over a network, comprising the steps of:

3 estimating a plurality of distribution factors indicating effects on one or more
4 congestible lines in the network due to transfers of the commodity at respective
5 locations in the network; and
6 producing portfolio of price risk instruments for the market based on the estimated
7 distribution factors.

1 8. The method for hedging according to claim 7, wherein the step of producing the
2 portfolio includes the step of eliminating an effect of congestion prices for congestible
3 lines on prices of the commodity at respective locations in the network.

1 9. The method according to claim 7, wherein the step of producing the portfolio
2 includes selecting a portfolio y of price risk instruments, such that $z'A - y'P'A = 0$, where
3 A represents the distribution factors, P represents the available market of price
4 instruments, and z represents the underlying position.

1 10. A portfolio derived by the method according to claim 9.

1 11. A method for identifying arbitrage opportunities among a plurality of available
2 price risk instruments in a market related to a commodity delivered over a network,
3 comprising the step of:

4 estimating a plurality of distribution factors indicating effects on one or more
5 congestible lines in the network due to transfers of the commodity at respective
6 locations in the network; and
7 producing a portfolio of price risk instruments from among the available price risk
8 instruments based on the estimated distribution factors, wherein a number of the
9 price risk instruments is greater than a number of the one or more congestible
10 lines.

1 12. The method according to claim 11, wherein the step of producing the portfolio
2 includes selecting a portfolio y of price risk instruments, such that $y'P'A = 0$, where A
3 represents the distribution factors, and P represents the available market of price
4 instruments.

1 13. A portfolio derived by the method according to claim 12.

1 14. A method of identifying arbitrage opportunities among a plurality of available
2 price risk instruments in a market related to a commodity delivered over a network,
3 comprising the step of:
4 modeling locational prices of the commodity in the market as a linear combination of
5 congestion prices for congestible lines in the network; and
6 producing a portfolio of price risk instruments from among the available price risk
7 instruments in a proportion such that an effect of the congestion prices for the
8 congestible lines on the locational prices of the commodity is eliminated, wherein
9 a number of the price risk instruments is greater than a number of the one or more
10 congestible lines.

1 15. The method according to claim 14, wherein the step of producing the portfolio
2 includes selecting a portfolio y of price risk instruments, such that $y'P'A = 0$, where A
3 represents the linear combination, and P represents the available market of price
4 instruments.

1 16. A portfolio derived by the method according to claim 15.

1 17. A computer-readable medium bearing instructions for managing risk in a market
2 related to a commodity delivered over a network, said instructions being arranged to
3 cause one or more processors upon execution thereby to perform the steps of:
4 modeling locational prices of the commodity in the market as a linear combination of
5 congestion prices for congestible lines in the network; and
6 producing a combination of price risk instruments for the market in a proportion such
7 that an effect of the congestion prices for the congestible lines on the locational
8 prices of the commodity is reduced.

1 18. A computer-readable medium bearing instructions for evaluating a portfolio of
2 price risk instruments in a market related to a commodity delivered over a network, said
3 instructions being arranged to cause one or more processors upon execution thereby to
4 perform the steps of:

5 estimating a plurality of distribution factors indicating effects on one or more
6 congestible lines in the network due to transfers of the commodity at respective
7 locations in the network; and
8 evaluating the portfolio based on the estimated distribution factors.

1 19. A portfolio comprising: a plurality of price risk instruments for a market related
2 to a commodity delivered over a network,

3 wherein the price risk instruments y are proportioned such that $z'A - y'P'A = 0$,

4 A represents distribution factors describing the physics of power flows in the
5 network,

6 P represents the available market of price instruments, and

7 z represents a market participant's underlying position in the market at a prospective
8 time T .

1 20. The portfolio of claim 19, wherein a number of the price risk instruments is
2 greater than a number of the at least some congestible lines.